

school officers of 144 towns of less than 7000 inhabitants, and 196 larger cities, as to the good or evil result therefrom. There is an almost uniform reply in its favour. Only 19 out of the whole number separate the sexes, and only 12 out of these speak decidedly against it. The general morality and tone of society in America prevent its having any mischievous effect, while their innumerable small schools necessitate a large supply of female teachers who are the better qualified by their early competition and parallel education with boys. The Bureau, however, calls attention to the fact that both advantages may be absent in an older and more thickly populated country where concentration and division of labour is more practicable.

THE Report of the Manchester Public Free Libraries is a very satisfactory one, showing that since 1876-77, when the issues of books had been decreasing for several years, a steady revival has set in and their circulation has increased more rapidly than the population. Nothing also speaks so well for the successful work, present as well as prospective, of both central and district libraries as the new catalogues of first one and then another which have followed each other at average intervals of six months only.

ON November 22, at about 9 a.m., a remarkable phenomenon was observed at Alfia in the province of Helsingland. The weather was mild and calm, and the sky clear, when from the north the rays of an aurora began to develop, and soon bathed the northern heavens. Down by the eastern horizon a heavy dark cloud rested, from which a magnificent meteor suddenly darted forth. It traversed almost the entire heavens, spreading a deep lurid light over every object, before which even the aurora paled. The simultaneous observation of a starlight sky, a flaming aurora, and a splendid meteor in the depth of winter is described as very striking.

THE *Revue Positive*, which has been edited by the late M. Littré, and latterly by M. Wirouboff, has published its last number. The reason alleged is the want of interest now felt in France for merely theoretical questions, and the success obtained in a number of special directions by the principles of positive philosophy. It has lived fifteen years.

PART III. VOL. II. of the *Memorie della Società Geografica Italiana* is entirely occupied with the working out of the zoological collections made during the Italian Expedition to Equatorial Africa. Signor Vinciguerra treats on the freshwater fishes, M. A. de Bormans on the Orthoptera, M. C. Oberthür on the Lepidoptera, and M. Lethierry on the Hemiptera; in all cases there were new forms to describe, and the most interesting Lepidoptera are illustrated on a large folded plate. These memoirs appeared originally in the *Annali del Museo Civico di Storia Naturale di Genova*, but will be useful in their collected form.

EARTHQUAKES are reported (1) from Steinbruck (Styria), where a severe shock was felt on November 7 at 3 p.m., and a second one six minutes later, both in a vertical direction; (2) from Kaltenbach, near Müllheim, where a loud subterranean noise was heard, accompanied by a shock on November 11 at 9 p.m. The phenomenon was also observed in the surrounding villages, and was preceded in the daytime by a severe thunderstorm; (3) from the neighbourhood of Trawnik (Bosnia), where, on November 15 at 9.45 p.m., a violent undulatory earthquake was felt, accompanied by subterranean noise. The phenomenon lasted five seconds, and its direction was from north-west to south-east. An earthquake is also reported from Patra (Greece), where a violent shock occurred on November 14 at 3.40 a.m.

IN connection with the Quekett Microscopical Club, six demonstrations upon elementary subjects connected with micro-

scopy will be given at University College, in Class Room No. 8, at 7.30, on the following evenings:—December 14, 1883, Cutting Sections of Hard Tissues, by T. Charters White, M.R.C.S.; January 11, 1884, Microscopical Drawing, by J. D. Hardy; February 8, the Sponge Skeleton as a means of recognising Genera and Species, by J. G. Waller; March 14, How to Work with the Microscope, by E. M. Nelson; May 9, Polarised Light, by Charles Stewart, F.L.S.; June 13, Staining Vegetable Tissues, by W. H. Gilbert.

ON the Zuiderzee interesting experiments were recently made with fog-horns of a novel construction. They are sounded by steam, and are worked after the fashion of Morse telegraphs with long and short sounds. Two ships were provided with the fog-horns; on each there were telegraphists working the horn, and the signals were distinctly heard and understood even if the distance between the ships was such that they lost sight of each other.

A GERMAN Meteorological Society was founded at Hamburg on November 18 last, when many eminent men of science were present. Dr. Neumayer was elected president; the object of the Society was defined as—"The cultivation of meteorology as a science and in its relations to practical life." The Society will support meteorological research and publish a meteorological serial. At the first meeting Dr. Hellmann spoke on twilight phenomena, Dr. van Bebbber on barometrical minima with erratic movement, and Dr. Köppen on his method of testing the results of weather forecasts.

THE additions to the Zoological Society's Gardens during the past week include two Lesser White-nosed Monkeys (*Cercopithecus pataurista*) from West Africa, presented respectively by the Rev. W. C. Willoughby and Mr. S. E. Sims; twenty Barbary Turtle Doves (*Turtur risorius*) from India, presented by Mr. A. T. Hirsch, F.Z.S.; two Bearded Titmice (*Panurus biarmicus*), European, presented by Mr. H. D. Astley, F.Z.S.; a Water Rail (*Rallus aquaticus*), British, presented by Mr. E. G. B. Meade Waldo; an Indian Crocodile (*Crocodilus palustris*) from India, presented by Sir Joseph Fayrer, K.C.S.I., F.Z.S.; two Scaly-breasted Lorikeets (*Trichoglossus chlorolepidotus*), from New South Wales, a St. Thomas's Conure (*Conurus xantholenus*) from St. Thomas, West Indies, four West African Love Birds (*Agapornis pullaria*) from West Africa, two Undulated Grass Parrakeets (*Melopsittacus undulatus*), a Cockateel (*Colapitta novaehollandiae*) from Australia, two Indian Crocodiles (*Crocodilus palustris*) from India, deposited; a Hairy Porcupine (*Sphingurus villosus*) from Brazil, on approval; two Gird Buntings (*Emberiza cirrus*), British, purchased.

OUR ASTRONOMICAL COLUMN

ENCKE'S COMET.—On October 16 M. Otto Struve presented to the Imperial Academy of Sciences of St. Petersburg a new memoir on the motion of Encke's comet, by Dr. Backlund, of the Observatory at Pulkowa, who has continued the researches commenced by the late Dr. von Asten. Shortly before the decease of the latter, in August, 1878, he had completed a memoir upon this comet, in which it was proved that the appearances between 1819 and 1858 might be comprised, so to say, under a single formula, adopting one value for the effect of a resisting medium; or an acceleration of $0''.104$ in the mean motion in each revolution. Nevertheless the observations at the different returns were not represented with such a degree of precision as to exclude a probable error of $9''.0$ for each co-ordinate of a normal position, and for certain appearances the agreement with the formula was so little satisfactory that a suspicion arose of the existence, besides gravitation and a resisting medium, of other agents which had affected the motion of the comet. The suspicion was further increased when it was found by Asten that

the appearance in 1871 could in no way be included under the general formula, without admitting that the resisting medium had ceased to operate, or that the comet during the revolution immediately preceding had undergone a sudden retardation through the intervention of some unknown force. Following up at first the latter hypothesis, he was able to assign approximately the time when such perturbation must have taken effect, and found that at this time the comet was traversing the region of the small planets between Mars and Jupiter. This circumstance led Astén to conjecture that the attraction of one of these bodies, which the comet had encountered, might have occasioned the retardation.

A similar retardation was indicated again by the last appearance of the comet in 1881, and, following a similar method, Dr. Backlund was able to fix the time and the approximate place, which was again found to be in the midst of the zone of small planets. Thus, as M. Otto Struve remarks in his report upon Dr. Backlund's memoir, there was reason to think that we were upon the traces of a very interesting discovery, which added much to the interest attaching to his new researches on the last four appearances of the comet, as a complement to the investigations of Astén for the period 1819-1868. This additional work has not, however, led to a confirmation of the above-named hypothesis, but has replaced it by results of a more positive character and of greater scientific importance.

Dr. Backlund had found, on following rigorously the rules of calculation adopted by his predecessor, that the last four appearances, and particularly those of 1871 and 1881, could not be represented without admitting that the acceleration had diminished considerably, and had even disappeared for the last two returns. But on a closer examination it was discovered that a strange error had entered into the combination of the appearance of 1868 with the two preceding ones; in one of these revolutions where the observations made after perihelion were combined with those made before the succeeding one, Astén, though he supposed he had taken into account the resistance, had in fact not done so. This being rectified, the errors of 1871 and 1881, which amounted to many minutes, were destroyed in great measure, and the discordances reduced to tolerable though still unsatisfactorily large quantities. After a revision of the formulæ employed, Dr. Backlund succeeded in reducing the probable error remaining in each co-ordinate of a normal position to $4''.1$. The introduction of the mass of Jupiter, according to the determination of Bessel-Schur, further reduced this probable error to $2''.8$, assigning for the acceleration during the period in question $0''.054$ for each entire revolution, and M. Struve considers that Dr. Backlund's researches have thus put us in possession of a theory of the comet for its later returns which leaves little or nothing to be desired.

It has been mentioned that for the period 1819-1868 the probable error in the normal positions given by Astén amounted to $9''.0$. Partly, perhaps, the larger error is attributable to the inferiority of the instrumental means available in the first half of the century, but probably in a greater degree to imperfections detected in the theory adopted for this earlier period, upon which M. Struve's report enters into some detail. For this reason Dr. Backlund has charged himself with the construction of a new theory for the interval 1819-1868, in which he will be much assisted by the earlier work of Astén, described as having been left in admirable order, and thus admitting of being followed and verified at every step.

While awaiting the results of these further investigations, M. Struve draws attention to a very singular fact, which will not be affected by them. He remarks there is no reason to doubt that the acceleration has much diminished in the interval between the mean epochs of the two periods referred to above. He asks: Is it that the volume of the comet has diminished in the interval? The observations afford no trace of such diminution. Or again,—has the matter of which the comet is composed been increased? On this we can say nothing. There is, further, the supposition that the so called resisting medium has altered in density, or again, that the acceleration attributed to the effect of a resisting medium is produced by forces of a totally different nature.

All this for the moment must remain enigmatical, but the fact is established that the acceleration has diminished; we cannot say whether this diminution has been produced instantaneously or gradually; it is a point upon which the new researches undertaken by Dr. Backlund may enlighten us.

Encke's comet returns to perihelion in March, 1885.

GEOGRAPHICAL NOTES

THE eleventh number, 1883, of Petermann's *Geographische Mittheilungen* opens with a minute account of the archipelago of Chiloe, by Dr. C. Martin, who in former numbers of the *Mittheilungen*, in the *Revista científica de Chile*, and in other publications, has already communicated important information on this part of the earth's surface. The present contribution has special reference to vol. viii., recently published at Santiago, of the *Anuario de la Marina de Chile*. The next article gives an interesting sketch of the progress of the knowledge of Kafiristan by Europeans from 1829, when it first became known to Elphinstone, down to the present year, when Mr. McNair, the Indian Government surveyor, penetrated as far as the Dorah Pass; and an account of the present state of the inhabitants ethnographically, ethologically, socially, morally, and religiously, according to the reports of the Rev. Mr. Hughes and other recent visitors. The third article traces the route of the Russian Embassy of 1878-79 through Afghanistan and the Khanate of Bukhara, following the descriptions of Dr. J. Jaworski, member of the Russian Geographical Society, who as physician accompanied the Embassy, and has recently published an account of the expedition in two thick octavo volumes in Russian. In a long paper illustrated by a map by Bruno Hassenstein, which also embraces Dr. Junker's expedition through those parts, Dr. Emin-Bey prosecutes his travels to the west of the Bahr-el-Jebel in October and November of last year. Starting from Bedden, on the White Nile, on October 9, he penetrated south-westwards as far as Janda, the extreme southern post in the Kakuak country, whence he proceeded north-westwards through the Fadjelu Land, the station Kabjendi, the region of the Makraka and of the Abuka, as far as the station of Gosa. From this point Dr. Emin-Bey turned south-eastwards through the Abukaja country, and the Makraka-Ssgaire stations, and on November 26 arrived at the station of Wandi. The Makraka are described as a people dowered, both men and women, with a remarkable profusion of hair, which by means of fat, the sap of trees, &c., they studiously arrange in plaits, pigtails, &c., producing very surprising effects. The name Makraka, though now universally applied to the people of that region, was, it appears, not the original name, but, signifying cannibals, was at first used by the natives to designate a body of invaders of the Iddo race from the south. Dr. K. Zöppritz, in the next following article, discusses Dr. Emin-Bey's measurements of heights and atmospherical pressure at Lado.

WE have also received the *Mittheilungen* of the Geographical Society in Hamburg for 1880-81. It contains a very copious account of the Island of Chios (or Scio) geographically, geologically, ethnologically, and commercially; a lecture on the cola-nut, delivered before the Geographical Society of Hamburg on January 5 of last year, and an instructive description of the "sacred" Japanese town of Kioto. Next follows a very careful and comprehensive account in 250 pages, by Dr. H. Siegler-schmidt, of the results of the North Polar expeditions of this century. After summing up our knowledge of the North Polar regions in the year 1818, the review traces the history of North Polar investigation since that date, taking stock, in particular, of our knowledge of East Greenland, Spitzbergen, the Siberian glacial sea, and other hyperborean tracts. Lastly, it draws up the total results down to the present date in respect of hydrography, meteorology, magnetism, astronomy, &c. In the next article Herr E. R. Flegel gives the first of a series of sketches intended to comprise (1) the mangrove swamps of the delta of the Niger; (2) the mountains of Cameroon; and (3) the banks of the lower Niger. In this first sketch we are introduced to the long and narrow sandy strip of land rising but little above the level of the sea, and running parallel with the coast of the Bight of Benin.

THE *Verhandlungen* of the Berlin Geographical Society, Band x., No. 7, contains a very copious article on Wisconsin; and the *Zeitschrift* of the same society, No. 105, gives the conclusion of Dr. Richthofen's account of his travels in China, as also, among other valuable papers, a contribution to the ethnography of the extreme north-east of Asia, by Herr G. Gerland.

WE have further received the *Bulletin de la Société de Géographie* for the second and third quarters of this year. An article by M. Grandidier briefly describes the province of Imerina, the central, as also the most populous and important, province of Madagascar. The province is mountainous, traversed by numerous water-courses, entirely bare of tree or shrub, or often even of cultivated plant, scarcely inhabited in the hilly grounds, but thickly peopled